

Andrews (J. A.)

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Causes, Prevention and
Treatment.

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REPRINTED FROM
The New York Medical Journal
for October 24 and 31, 1885.



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CONTAGIOUS CONJUNCTIVITIS; ITS CAUSES, PREVENTION, AND TREATMENT.*

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THE literature of bacteriology fairly bubbles over with ingenious hypotheses; and yet the germ theory of disease is justly one of the chief principles of modern science, and substantial facts are steadily being brought forward to prove the influence of bacteria as morbid agents. It certainly is true that reports have reached us which would seem to negative the deductions from some of the experiments of prominent workers in this field of investigation; but there has been a great deal of hasty and groundless opposition to these researches. However, the inquiry into this matter is being vigorously pushed by skillful workers in the laboratories of Germany and France, and research of such vast importance to the whole human race deserves the greatest possible encouragement, and should not be regarded alone with the intellectual interest which theoretical inquiry excites.

The views which I shall have the privilege to lay before you this evening are the outcome of a practical inquiry

* Read before the New York Academy of Medicine, June 18, 1885.

into the cause and prevention of contagious conjunctivitis. I can only regret that the case of successful inoculation of a pure culture of the gonococcus which I made a short time since did not have for its field of operation a healthy human tissue; however, it is for others to decide whether the result obtained be of value or not.

In May, 1882,* Neisser declared that the gonococcus originally described by him in 1879 was the pathological principle of gonorrhœa; that it was the actual contagium of the gonorrhœal affection. That the presence of a micrococcus form is constant in the secretion of gonorrhœa has been confirmed by Bokai, Weiss, Aufrecht, Ehrlich, Brieger, Gaffky, Sattler, Leber, Haab, Hirschberg, Sternberg, and others; but all writers are not agreed that the micrococci they have seen in gonorrhœal pus were those occurring only in gonorrhœa, or the same which are found in all pus which has been exposed to the air, or that they differ in form and size or in other characteristics from the micrococci of other blennorrhœas. Neisser maintains that the "gonococcus" is a specific kind of coccus, which is not alone functionally but morphologically characteristic.

According to its discoverer (Neisser), the gonococcus is comparatively large, flattened on the side which is turned toward its neighbor, somewhat oval, seldom single, almost throughout double. It lies close to its neighbor with only a fine fissure between the two; in shape it is "*semmel-förmig*." It multiplies by division transversely, forming a pair, these dividing at right angles to the first line of division, thus forming a group of four; they never occur in the chain-form; they are found free in the fluid, or more frequently adherent to the pus-corpuscle and epithelium. The arrangement in groups of two and four is constant in gonorrhœal pus, and, although this grouping is sometimes seen in

* "Deutsche med. Wochenschrift," No. 20, 1882, p. 279.

specimens of pus from other sources, the chain-form is the more common in them. Bockhart found the gonococcus group mostly on the pus-cells or their nuclei, never in their interior; Haab, on the contrary, found them within the nuclei.

Eklund* denies that the gonococcus is alone specific for gonorrhœa, because he professes to have found similar organisms in acute and chronic purulent processes in the lungs and intestines, in ulcerative stomatitis, etc. But the bacterium of gonorrhœa seems to possess an ability which all forms which resemble it do not—viz., that of penetrating into the living cell protoplasm and of multiplying in it; but this power is soon exhausted.

In the normal human saliva there are micrococci which resemble those of gonorrhœal pus; but, if there is a morphological resemblance, their functional characteristics are, at least, not the same as those of the gonococci. There is a short, thick bacterium in the vaginal secretion, swelled by coloring agents and looking like a diplococcus. Bumm and Bockhart profess to have found the "semmelförmig" diplococcus in the secretion of the female genitals, in diphtheritic sores, in ulcerative process in the mouth, and in a preparation of the sputum of a patient with whooping-cough. Welander† found Neisser's gonococcus in all cases in which he looked for it—among 129 cases of acute and 15 cases of chronic urethral blennorrhœa; even cases of eight to sixteen months' duration were not excepted.

Neisser twice saw profuse purulent discharge from the urethra of a man which occurred after very frequent catheterization preparatory to lithotrity. The secretion contained

* F. Eklund, "Note sur les microbes de la blennorrhagie," cited in Schmidt's "Jahrbücher," Bd. cxcvii, 1883, p. 139.

† Reviewed in "Vierteljahresschrift f. Dermatologie u. Syphilis," 1884, p. 178.

abundant evidence of the presence of bacteria, but no gonococci were found.

In my case of successful inoculation of a pure cultivation of gonococcus I proceeded in the following manner: The cultivation medium was serum of the blood of the ox, prepared according to Koch's directions, being heated daily one hour, for six successive days, to 58° C., and thus sterilized and gelatinized by subjecting the serum to a temperature of 65° C. A small quantity of fresh pus from a case of acute urethral gonorrhœa was allowed to drop from the urethra on to the sterilized platinum-wire, and then to drop off the latter, leaving only a thin layer of pus on the wire; the wire, thus charged, was thrust into the firm blood-serum in three or four different places, and the test-tube closed with sterilized cotton-wool; a number of test-tubes were thus planted and placed at once in the incubator, the temperature of which was maintained in different cultivations at 32° – 36° C. After about twenty-four hours, further inoculations were made from the first tubes. With the seventh generation I inoculated a human conjunctiva. The case was one of granular conjunctivitis *in stadio cicatricio* and with dense pannus, but without purulent secretion or any discoverable cocci in the conjunctival secretion. The choice of treatment lay between the use of jequirity and inoculation with gonorrhœal pus. Nothing was concealed from the patient, and he sanctioned the inoculation with full knowledge of what the consequences might be. I had unsuccessfully inoculated so many different animals with cultures of the gonococcus that I hailed with extreme delight this opportunity to make the trial in the case of a human being. Three weeks previous to this operation I had inoculated the same eye with a pure cultivation of the coccus taken from my own saliva, the result having been negative. I prepared the conjunctiva for the reception of the pure cultivation of the gonococcus by washing

the conjunctival surface for several days with *pure water*. I then conveyed the cultivation to the conjunctival sac and bound up the eye with a roller bandage and absorbent cotton-wool, due attention having been given to the condition of these things. The result was a perfect picture of gonorrhœal conjunctivitis with abundant evidences of the presence of the gonococcus.

Bockhart* obtained a successful inoculation, from a pure cultivation (gelatin) of the *fourth generation* of the gonococcus, on the sound human urethral mucous membrane. The subject of the experiment was a forty-six-year-old paralytic whose death was expected daily. On the sixth day a typical gonorrhœa was formed, which increased in severity up to the twelfth day, when the patient died. The characteristic gonococci were found in the secretion.

Sternberg's criticism on this case is, that the fourth successive cultivation is not sufficient to insure the exclusion of the original material—"a hypothetical non-living virus"—"when the cultivation is conducted upon a solid substratum."

Sternberg did not succeed in producing urethral gonorrhœa in himself and two others with a pure culture of the gonococcus.

Loeffler and Leistikow † had negative results after inoculation of apes, dogs, and rabbits with a pure growth of the gonococcus.

Krause ‡ cultivated the cocci from ophthalmia neonati on blood-serum, and with the pure cultivation inoculated the cornea, conjunctival sac, and urethra of full-grown rabbits, and adopted the same procedure in the case of young cats,

* "Beitrag zur Aetiologie und Pathologie des Harntrippers:" "Vierteljahresschrift f. Dermatologie u. Syphilis," 1883, Heft i, p. 8.

† "Verhandlungen der Gesellschaft der Charité-Aerzte zu Berlin," Sitzung vom 16 Februar, 1882.

‡ "Centralblatt f. prakt. Augenheilk.," May, 1882, p. 137.

pigeons, and mice; but these experiments, as well as subcutaneous inoculation of rabbits and mice, were without result. Krause then inoculated the conjunctival sac of newborn rabbits (six to ten days old) with the same cultivations (from ophthalmia neonati), and produced a purulent conjunctivitis, which was present twenty-four hours after the transfer, and in the course of the following days became more intense. Three of the rabbits died, on the fifth and seventh days after the inoculation, from other causes; one animal lived for some time; in this one, on the tenth day there had developed a very profuse purulent discharge from the conjunctiva; the pus had the ordinary cheesy character of rabbit's pus, and contained, in addition to bacterial contaminations, numerous cocci which were somewhat smaller than those of Neisser. On the following day there was an abscess of the cornea, which perforated the latter. Krause does not assert that this result should be accepted as conclusive. He maintains that in this case Neisser's gonococcus was the active agent in the infection.

The successful inoculation of the urethras of three medical students with gonococci cultivated by Bokai can not be accepted as conclusive, because of the manner in which the cultivation was conducted.

It appears that animals are not susceptible to the poison of gonorrhœal pus, neither the cocci nor the pus itself being capable of reproducing the disease in them.

What interests us most is whether the gonococcus is the cause of gonorrhœa in the human subject; and when the objection, that the essential agent in the infection is a soluble unorganized substance contained in the pus used for inoculation of the cultivation medium, has been removed by isolation of the coccus, and the disease is induced with it alone, then we have very strong facts to argue from.

ÆTIOLOGY OF OPHTHALMIA NEONATI.—According to von Graefe, all inflammations of the conjunctiva are contagious through the secretion which they furnish—contagious in the sense that this secretion must be conveyed to the conjunctival sac of a healthy eye. The more intense the swelling and discharge from the original diseased mucous membrane, and the more acute the inflammation of the latter at the time of the conveyance, the more active will be the poison. The hypothesis of contagion through the air was admitted by von Graefe, and is still held by some excellent observers; but infection through this source, I feel sure, is quite rare, and, when there seems to be no other source than the atmosphere to fall back upon in a given case of contagious eye-disease, we should still refer to the atmosphere as a probable source of infection with misgivings.

The chief cause of ophthalmia neonati is infection derived from the genitals of the mother, either at the time of birth of the child or a short time afterward, the poison in the latter instance being transferred to the child—healthy at birth—through the medium of the bath-water, but much more probably through sponges, towels, etc.

Credé maintains that a *pure catarrhal secretion* of the genitals does not produce blennorrhœa, but Haussmann * says that the vaginal secretion may be infectious. Zweifel † inoculated normal lochial secretion upon the conjunctiva of the new-born in six cases without producing blennorrhœa even once. I inoculated normal lochial secretion upon the conjunctiva of the new-born in three instances, the result being negative. In spite of these facts, it has been maintained that the normal lochia does give rise to conjunctival

* "Archiv f. Gynäkologie," 1881, Bd. xxi, p. 523.

† "Archiv f. Gynäkol.," Bd. xxii, p. 329; see, also, his recent communication on these cases, same Archives, Bd. xxiii, p. 325.

blennorrhœa. But there is no positive proof that this is anything more than a mere assertion.

We know that gonorrhœal pus, placed in a healthy human conjunctival sac, gives rise to the same disease with the precision of a physical experiment; therefore the view that normal lochial secretion produces conjunctival blennorrhœa in one person and not in another seems, according to this reasoning, to be untenable.

I believe that the infection occurs some time after the birth of the child much more frequently than is generally supposed, the original source of the infection being the same as in the first instance; and from this original cause many other eyes may be infected by direct conveyance of the poison to them by the mother or nurse. I could cite many instances in my own experience to support this statement. The cases of purulent conjunctivitis which occurred in my service at the Nursery and Child's Hospital (Country Branch) in 1879 originated in this way.

At the Foundling Hospital in St. Petersburg during six years 2,918 cases of ophthalmia neonatorum were observed, and simultaneously 345 wet-nurses of the children were attacked with the same disease.*

Theremin† has recorded a table from the same institution embracing six subsequent years, according to which 476 cases of "blepharo-blennorrhœa" occurred, and the relative frequency of the disease at and after birth is indicated as follows: On the first to the fourth day, fifty-seven cases; from the fourth to the eighth day, one hundred and thirty-four cases; from the eighth to the fourteenth day, ninety-four cases; later, one hundred and ninety-one cases.

* Froebelius, "Medicinische Zeitung Russlands," 1885, Bd. xii, No. 33, p. 257; cited by Hausmann.

† "St. Petersburger med. Zeitschrift," Bd. v, p. 97; cited by Hausmann.

Olshausen thinks that when the disease occurs after the fourth day the child was infected after birth. Although ophthalmia is infrequent among the better class of patients, it is quite common among the ignorant poor, and the homes of such people are constantly menaced by the danger of a child at the breast, already a victim of the disease in question, infecting the whole family. Haussmann thinks that the purulent secretion from a sore nipple may become a source of infection.

The question has been freely discussed as to whether Neisser's gonococcus is the special bacterium of this disease. Whoever may be interested in reading over the contradictory views on this subject will find an abundance of material in Haussmann's work, "*Die Bindehautaffection der Neugeborenen*," Stuttgart, 1882. Leopold and Wessel* tell us that, of eighteen mothers whose children were not placed under prophylactic treatment, gonococci were found only in the case of one mother, and, on the third day after the birth of her child, the latter presented the familiar appearances of conjunctival blennorrhœa. No gonococci could be found among the remaining seventeen women, and their children remained free from any inflammation of the eyes. Their article contains many instructive details which it would be quite impracticable to incorporate in the present paper, which has already assumed proportions much greater than I had originally prescribed for it.

Haussmann † cites the statistics of Cederskjöld, of Stockholm, according to whom the eyes of the children of mothers with blennorrhœa were diseased in 14·6 per cent., and of the children of mothers free from blennorrhœa only

* "*Archiv f. Gynäkol.*," 1884, Bd. xxiv, p. 93.

† "*Die Bindehautaffection der Neugeborenen*," Stuttgart, 1882, p. 22.

5.52 per cent. were affected. But the 5.52 per cent., were they not infected by the others?

GRANULAR CONJUNCTIVITIS.—At the Ophthalmic Congress in Heidelberg, in 1881, Prof. Sattler announced that he had succeeded in finding in the conjunctiva of granular conjunctivitis micrococci which resembled those of Neisser, and that with a pure cultivation of those cocci he had reproduced the disease in question in a man. Leber confirms Sattler's statement as to the finding of cocci in the tissue of granular conjunctivitis. About thirty years ago Arlt* taught that there was an intimate relationship between granular conjunctivitis and struma, also tuberculosis. This view has been pretty generally abandoned by ophthalmologists of the present time, and Sattler's discovery might dispose us still further to differ with Arlt, but it is very probable that Sattler is in error in this matter. I have searched in vain for any micrococcus form in the tissue of granular conjunctivitis. In a paper published last year† I gave the details of the manner in which I had proceeded in investigating this question. I had examined 1,500 sections taken from 37 cases of trachoma without being able to find any cocci in them. I have since carefully examined five cases of this disease, with the same end in view, but, although I have applied the proper staining agents and the other indispensable aids in such examinations—*i. e.*, Abbe's condenser and the homogeneous immersion of Zeiss—I have never succeeded in finding any cocci in these tissues, except in cases of trachoma accompanied by an active catarrhal process. But cocci are found in the secretion of granular conjunctivitis, and the disease is unquestionably contagious, and the secretion is the carrier of this contagion; but there is this peculiarity about the disease, that it requires that certain constitu-

* "Die Krankheiten des Auges," Prag, 1858, i, pp. 130, 131.

† "Archives of Medicine," vol. xi, June, 1884, p. 221.

tional conditions shall obtain in order that the disease may be reproduced in another to whose eye the secretion has been transferred. It is a clinical fact that struma and trachoma generally go hand in hand, and *overcrowding, filth, and poor food* are the essential factors in the production of this terrible disease.

DIPHTHERITIC CONJUNCTIVITIS.—Fortunately for us, diphtheritic conjunctivitis is a rare disease in this country. Its mode of origin and course harmonize thoroughly with the doctrine of its dependence upon pathogenic micro-organisms. Its contagiousness is undisputed, and the germ theory affords the best explanation of its phenomena; and yet, in spite of many elaborate researches, the precise nature of the diphtheritic virus is still a matter of doubt. The majority of those who have studied the question from the pathological and experimental side declare in favor of a specific micrococcus which is found imbedded not only in the membranous deposit, but also in the lymphatic spaces, beneath the mucous membrane, in the blood, and in the internal organs—Oertel, Eberth, and Klebs. Loeffler * details an extensive experimental inquiry upon diphtheria in animals and man. He confirms the fact that micrococci prevail in diphtheritic membrane mingled with other forms of bacterial life, which find a suitable nidus in the necrosed and decomposing tissue; but he lays special stress, from the aetiological point of view, upon the presence of a bacillus first made known by Klebs. This organism invariably occurs in association with the micrococci, but presents, far more than these do, the attributes of a specific virus.

The micro-organism which Emmerich † alleges to be

* Friederich Loeffler, "Mittheilungen aus dem kaiserlichen Gesundheitsamte," Bd. ii, 1884, p. 421.

† R. Emmerich, "Deut. med. Wochenschrift," 1884, No. 38, p. 614.

distinctive occurs in the diphtheritic lesions both of the pigeon and of man, is neither a coccus nor a bacillus, but a short, thick bacterium, which, in gelatin cultivations, forms a pellucid, grayish color, assuming a whitish appearance as it develops, and not liquefying the gelatin. It grows luxuriantly on the potato, forming on it a thick yellowish-white layer, but in blood-serum the bacterium does not grow well. In form, size, and mode of growth the diphtherial bacterium of man is identical with that of the pigeon. Inoculations were successfully made with this organism. But very great difference of opinion prevails among bacteriologists themselves as to the morphology of the diphtherial fungus. Emmerich thinks diphtheria is essentially a *house-disease*, prevailing in those seasons in which dwellings are most likely to be overcrowded.

PROPHYLAXIS OF OPHTHALMIA NEONATI.—Starting from the proposition that the infection of this disease is derived, in the first instance, from a pathological vaginal secretion from the mother, thorough and judicious cleansing of the diseased vagina should be practiced before the birth of the child, and, when the child of such an infected mother is born, its eyes should be washed with a saturated solution of boric acid, and a two-per-cent. solution of nitrate of silver be dropped into the conjunctival sac; and the child and mother should not alone be kept from other children, but the mother should be told of the contagious character of her disease and warned against using towels, sponges, or cloths that have been used on her own person, for wiping her child.

The eye-trouble begins about the second or third day after birth, also sooner or later; the sooner, the more intense it will be, generally.

Credé first tried thorough cleansing of the diseased vagina of the mother before the birth of her child. The

number of cases of eye-trouble was diminished thereby, but it did not disappear. Then he began to disinfect the eyes of the children, and the results were more favorable. This is quite natural, because, if the child is infected at the time of its birth, no amount of attention bestowed upon the mother would affect the child so long as it was neglected. At first Credé proceeded as follows: In all cases of gonorrhœa or chronic vaginal catarrh in the hospital, the vagina was frequently washed with lukewarm water, or a solution of carbolic acid, or salicylic acid, two per cent.; near term this was done every half-hour. The eye-trouble was less frequent, but it was not stamped out. In 1879 he made the first trial of prophylactic instillations into the eyes of the new-born immediately after birth, and used a solution of borax (1 to 60) without satisfactory results.* Then he tried a solution of nitrate of silver (1 to 40), which was dropped into the eyes soon after birth. These instillations were preceded by careful washing of the eyes with a solution of salicylic acid (two per cent.). Children thus treated remained free from eye-trouble. From June 1, 1880, all eyes, without exception, were, immediately after birth, first washed with plain water and disinfected with a solution of silver nitrate (two per cent.), a single drop being placed in each eye; then the eyes were cooled with pledgets of linen wet in a solution of salicylic acid (two per cent.). The vaginal douching was, on the contrary, discontinued. Only one child, on the sixth day, had a mild conjunctivitis of the left eye, without swelling of the eyelids, and was cured in three days. It was shown in this case that in the hurry the prophylactic instillations had not been made. Sometimes a slight hyperæmia followed these instillations, and now and then there was a slightly increased secretion in first twenty-four hours; these appearances do not persist after the first

* "Archiv f. Gynäkol," 1881, Bd. xvii, p. 52.

day. Previous to the introduction of this treatment in Credé's clinic at Leipzig ten per cent. of the children born there had eye-trouble; since its employment, from June 1, 1880, till March, 1883, the percentage was reduced at once:

1880 (7 months),	211	children,	1	case;
1881	400	"	1	"
1882	418	"	2	cases;
1883	131	"	No	case.

1,160

The patient in 1880 was not disinfected. The mother, in one of the two cases which occurred in 1882, had syphilis and gonorrhœa, and what is of interest to us to remember in this connection is that, in spite of the instillation of silver nitrate (two per cent.) immediately after birth, it was too late. Credé says that the other case (1882) resembled one of catarrhal conjunctivitis.

Abegg* washed the eyes with pure water immediately after birth. The result was that among 2,266 births there were 66 cases of ophthalmia neonatorum, or about three per cent.

At the suggestion of Alfred Graefe, Olshausen† used a one-per-cent. solution of silver nitrate, without previously washing the eyes, and reduced the percentage of ophthalmia neonati from 12·5 to 6 per cent.; but he observes that *the percentage would have been even smaller had the measures been more exactly practiced from the beginning.*

Hecker (München) used a one-per-cent. solution of silver nitrate as a prophylactic, but he had about as many cases as before, and Credé's criticism upon these results is that one per cent. is not sufficiently strong.

In Maternity Hospital, Blackwell's Island, New York,

* H. Abegg, "Archiv f. Gynäkol.," 1881, Bd. xvii, p. 503.

† R. Olshausen, "Centralblatt f. Gynäkologie," 1881, No. 2, p. 33.

Dr. Garrigues applied a two-per-cent. solution of silver nitrate to the eyes of all the children born during his service at that institution from October 1, 1882, to March, 1883, and from October 1, 1883, till March 31, 1884, during which time 251 children were born, but not a single case of eye-trouble occurred among those children. Dr. Garrigues does not state whether any of the mothers were infected or not. At the same hospital, in Dr. Mundé's service, the house surgeon, Dr. B. Hughes Wells, informs me that between April 1 and May 15, 1885, 83 children were born, all of whom were treated with silver nitrate (two-per-cent. solution), there being not a single case of eye-trouble. In the six weeks preceding Dr. Mundé's service (Dr. Murray's service) 58 children were born. In this instance a one-per-cent. solution of silver nitrate was used, and there were more than 10 or 12 cases of ophthalmia neonati, but none of these cases led to loss of sight; only in one case was there ulceration of the cornea, and in this the latter was not perforated.

Horner* indorses Credé's treatment with silver as the most effective. In the discussion on Dr. Horner's paper, the expediency of employing this treatment in private practice was questioned. It was said that the eversion of the lids should not be intrusted to a midwife, because she might drop the solution on the cornea and damage it. Credé replied that he never everted the lids, because he deemed this superfluous; he dropped the silver solution (two per cent.) on the cornea without having seen a single case in which this cauterized the cornea.

Königstein† observed, among 1,092 children in Späth's clinic for whom no prophylactic measures had been adopted, blennorrhœa in 4·76 per cent.; catarrh in 14·5 per cent. He adopted Olshausen's plan of washing the eyes frequently

* "Correspondenzblatt der schweizer Aerzte," 1882, No. 7.

† "Wiener med. Presse," 1882, No. 24.

with a solution of carbolic acid, one per cent. Of those thus treated, two per cent. had blennorrhœa and six per cent. catarrh. Finally, of 1,300 children treated according to Credé's method, one half per cent. had blennorrhœa and six per cent. catarrh.

Felsenreich, in the clinics of Carl and Gustav Braun, reduced the percentage of blennorrhœa by Credé's treatment from 3.34 to 1.93 per cent.

In 1881, Bayer* treated 361 children at the Stuttgart Lying-in Hospital according to Credé's plan, and there was not a single instance of eye-trouble; while in 1880, among 354 children born at the same institution, there were 34 cases, and in 1879, among 351 children, there were 51 cases of ophthalmia neonati, no prophylactic treatment having been then employed.

At the Royal Lying-in Institute in Dresden, Credé's treatment was introduced on October 1, 1883.† The instillations were made about a quarter of an hour after birth, after the child had been washed and its eyes cleansed with a piece of linen dipped in fresh water. In a few cases, in the confusion occasioned by many births occurring in quick succession, the instillations were made somewhat later. From October 1, 1883, to July 10, 1884, 1,002 live children were born. Uncleanliness, intense erythrit, and granular erythrit were present in numerous instances, and other influences were also noted which might have contributed to favor a blennorrhœal infection in the children, but not a single case of blennorrhœal conjunctivitis occurred.

Credé's treatment, with its instillations of a two-per-cent. solution of silver nitrate, and especially the additional applications for twenty-four hours of a solution of salicylic acid (two per cent.) on pledgets of linen, involves a strict per-

* "Centralblatt f. Gynäkol.," 1882, p. 515.

† Leopold and Wessel, "Archiv f. Gynäkol.," 1884, Bd. xxiv, p. 89.

sonal supervision which must be counted. But the evidence, taken all in all, certainly proves the value of a two-per-cent. solution of silver nitrate as a prophylactic in ophthalmia neonatorum; yet it should not be used to the exclusion of scrupulous cleanliness.

In order to guard against post-natal infection—which, as I have said, I believe to be more common than that at the time of birth—children should be kept in their cots and not given to the mother (if she is infected) except at the time of nursing, and then all the precautions respecting the use of sponges, towels, etc., should be kept in mind.

If it is possible, by the means indicated, to cut down the percentage of cases of ophthalmia neonati so impressively as the statistics cited above would seem to prove that we can, it is quite impossible to exaggerate in words the importance of the gain.

Horner has shown that, among 100 blind asylums of Germany and Austria, between 33 per cent., or, to be more exact, between 20 per cent. and 79 per cent. of the blind children had lost their sight from ophthalmia neonati.

In a statistical report submitted to the Blind Congress in Paris, in 1879, F. Daumas declared that, of 56,391 eye-patients treated by himself, 1,178 had become incurably blind, 108 cases of blindness being due to incurable disease and 1,070 to curable disease.

In the United States, ophthalmia neonati causes blindness in numbers exceeding 32 per cent. of the cases of preventable diseases of the eye.

Now, inasmuch as blindness from the disease under consideration occurs mainly among the poor, and is due chiefly to ignorance regarding its dangerous character and the consequent neglect to apply prompt and effective medical aid, it behooves the profession to draw general attention, and especially that of midwives, to this very important subject,

Our general dispensaries might substantially aid the dissemination of this desired intelligence by having conspicuously printed on the card presented to every female patient who applies for medical aid the following INSTRUCTIONS REGARDING NEW-BORN INFANTS :

“ If the child’s eyes become RED and MATTER begins to RUN from them, at any time after birth, take the child at once to a doctor. THE DISEASE IS VERY DANGEROUS, AND, IF NOT TREATED AT ONCE, IT MAY DESTROY THE SIGHT OF BOTH EYES.”

Let me now give you an outline picture of purulent conjunctivitis as it is but too frequently seen at our eye-infirmaries. The mother takes her child to the infirmary with the statement that the child’s eyes had “ run matter ” for some days ; but the eyelids had become so red and swollen, and the child so restless, that she thought she had better take it to the hospital. We examine the eyes and find a large slough of one or both corneæ, and the sight of one or both eyes destroyed. Every eye-surgeon has seen many such cases. Could a stronger reason be given for the urgency of sending out words of warning to these unfortunate people ? A mother would not neglect early attention to her child with this disease if she knew how terrible the consequences would be of so doing. The next question is, How shall we treat such cases ? To return such a child to its own home would be to expose the rest of the family to the disease ; and, again, such patients are brought to us at the infirmaries three times weekly ; they then return daily to their homes, where the ignorance of the simplest rudiments of personal and domestic hygiene which invariably prevails there must necessarily neutralize whatever good they may have received at the hospital ; indeed, patients with this disease require to be under skilled and constant surveillance ; and, if our eye infirmaries will not receive these

cases because of the danger of infecting their other patients, the exigencies of the case are best met by the establishing of a separate hospital for the treatment of contagious ophthalmia.

In Great Britain steps were taken last year in the direction of making efforts to prevent the terrible consequences of ophthalmia in the new-born, and it is hoped that the committee appointed for the same purpose at the last meeting of this Academy will succeed better than our colleagues across the Atlantic in carrying out the plans they may agree upon to meet the end in view.

TREATMENT.—The attendant's hands and nails must be thoroughly cleansed and his or her eyes protected with *protective spectacles*. If one eye only is affected, its fellow should be sealed with cotton-wool, covered with adhesive plaster, and over this a solution of rubber should be painted, so as to exclude any discharge which may run over the bridge of the nose from the affected eye, and, in the case of infants, the hands should be secured, in order to keep them from the eyes. In the case of adults, a far better protective covering for the healthy eye is one recommended by Dr. Buller, of Montreal, which consists of a piece of macintosh, about four inches and a half square, with a watch-glass (old-fashioned, deep glass) fastened to a hole in the center through which the patient can see; the whole is then fixed by broad pieces of strapping to the nose, forehead, and cheek, its lower and outer angle being left open for ventilation. In case of redness or swelling of the conjunctiva, this covering must be discontinued and the conjunctiva painted, as a preventive, with a two-per-cent. solution of silver nitrate, followed by cold applications.

So long as there are increasing redness and swelling of the eyelids, together with rising temperature of these parts, and a watery or sticky, transparent secretion, which shows

that we have to do with a pure inflammation, the treatment must be anti-inflammatory, directed to the contraction of the paralytic vessels, and thereby diminish the filtration and diapedesis; and the remedy is the same in the case of the eye as in other parts of the body. The ice-cloths should be applied, and, according to the height of the local temperature, their use should be more or less vigorous; but, *under all circumstances, the cold applications must be diligently changed*, in order that the action of the cold may be as nearly as possible equable. When the local heat is very great, the cold must be maintained day and night.

When purulent conjunctivitis is fairly established, the indications for treatment are: 1, to wash away the infective material as thoroughly and as early as possible; 2, to render the conjunctival surface as nearly as possible aseptic. It is impossible to exaggerate the importance of securing a perfect fulfillment of the first of these conditions. If the disease is seen at the very onset, and the eye cleansed at once, its course will be less violent than where this is not done. This washing may be done with a saturated solution of boric acid, or a two-per-cent. solution of carbolic acid, the latter to be weaker as the discharge grows less. The eye must, of course, be carefully examined for any change in the cornea. It is not necessary that we should employ our solution in sufficient strength to be germicidal. The ordinary method adopted in purulent conjunctivitis of washing the eye with a so-called antiseptic fluid does not kill the bacteria in the secretion, but removes the contagious principle as completely as may be, or so dilutes it that it can do harm only in a less degree; and it will be found that the secretion actually decreases in proportion to the disappearance of the cocci from it. I think that for this reason the irrigation should be maintained for several minutes at a time—ten to fifteen minutes. I would then paint the conjunctival surfaces of

the upper and lower lid with a two-per-cent. solution of silver nitrate, or even twelve per cent. if the conjunctiva is much swelled; and, in case the latter strength is used, wash afterward with a solution of sodium chloride. The strength of the silver solution is to be regulated by the succulence and vascularity of the conjunctiva—the more pronounced these conditions, the stronger should the solution be. This having been done, *cover the conjunctiva with an antiseptic dressing consisting of boric acid (six per cent.) or carbolic acid (two per cent.) and vaseline.* The vaseline will be retained much longer than a watery solution would be. This dressing will, in a great measure, have the power (without injury to the cornea) of arresting the vital activity of the bacteria, of starving them out, as it were, by so changing the nutritive pabulum required for their development that they can not appropriate it to their use. The irrigation will have to be repeated as often as may be indicated by the quantity and quality of the discharge. If there is much swelling of the eyelids, the outer canthus should be cut. The application of cold should not be made with ice-bags. Pledgets of linen—to be burned after use—should be laid on a piece of ice at the bedside, and this application of cold requires care and a constant attendant.

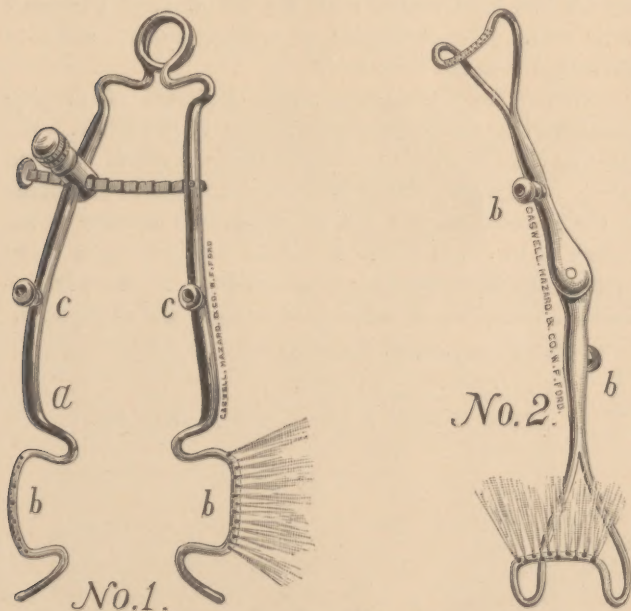
In the severe forms of gonorrhœal conjunctivitis—and this disease is nearly always very severe—when not seen very early and treated at once, the cornea runs great risk. The eyelids are intensely swollen, and when the ocular conjunctiva is much infiltrated the cornea is in great danger of suppuration, and the treatment should be directed to the reduction of the pressure on the eyeball and diminution of the secretion already formed. The pressure caused by the chemosis and swollen lids compresses the vessels which supply the margin of the cornea, causing an insufficient circulation. In order to remove this factor, the outer commis-

sure should be divided to its fullest extent, together with the canthal ligament. The late Mr. Critchett, of London, proposed to divide the upper lid vertically to the orbital margin in severe cases, evert the flap and fix it to the skin above, and he says the cornea does not suppurate when this is done. Fuchs* has modified this operation. He divides the outer commissure to such an extent as to relieve also the symptoms of pressure. He then puts a suture through the lower lid and attaches it on the cheek, ectropionizing it entirely. He detached the suture, in the case he reports, at the end of the fifth day, and the healing was good. If the cornea is involved, it requires special attention in addition to the use of atropine. A thorough removal of the secretion from the upper *cul-de-sac* is not possible by the ordinary means; this may, however, be done by means of a simple instrument which I have devised for the purpose. The instrument is an eye-speculum, the arms of which are hollow and the claw deeper than in the ordinary eye-speculum; it has a number of perforations for the passage of the fluid, which is supplied by a fountain syringe. It is inserted between the lids with great gentleness, and care should be taken not to injure the cornea with it. The lids should be gently lifted from the eyeball by means of the speculum, and the spray of fluid allowed to play upon the upper *cul-de-sac*. Even when the lids are extremely painful, it is a relief to have them gently lifted from the eyeball and the stream of fluid allowed to play upon the upper conjunctival *cul-de-sac*.

Of course the use of this instrument should not be intrusted to an ordinary nurse, but the physician can at least perform the operation twice daily, and keep up the irrigation for from ten to fifteen minutes. The solution of carbolic acid in the case of adults, when the inflammation is intense,

* "Centralblatt f. prakt. Augenheilkunde," 1881, p. 198.

may be as strong as three per cent.—to be diluted as the disease improves; this is astringent as well as antiseptic.



The instrument shown in Fig. 1 may be used for either eye, the tube with the water-supply being attached at *c*, and to the upper branch only in case it is desired to irrigate the upper *cul-de-sac* alone. Fig. 2 represents a folding lid-elevator (of large and small size) designed for the same purpose as the spring-speculum. The tube of the fountain syringe is attached at *b*.*

And the silver I would apply, according to the exigency of the case, in four-per-cent. or twelve-per-cent. solutions, and neutralize with salt and water, and then apply the medicated vaseline to the conjunctiva, and over the lids the iced cloths. Iodoform has not met with much favor in this disease. Quinine in solution has also been used, but it has no

* These instruments are made by Mr. W. F. Ford, of Messrs. Caswell, Hazard & Co.

advantage over the carbolic acid. Dr. H. Linds Ferguson (Dublin) reports cases of gonorrhœal conjunctivitis in which he has had good results from the use of finely powdered boric acid. The bichloride of mercury has no claim to advantage over the boric acid.

DIPHThERITIC CONJUNCTIVITIS.—Measures of prophylaxis based upon bacteriology must lie in the future. We must be content with the enforcement of general hygienic laws. Mr. Tweedy* used one-per-cent. solutions of quinine in this disease, and did not see any serious damage to the cornea when it was used. Iodoform does not seem to be of much use in diphtheritic conjunctivitis. Vossius† recommends a four-per-cent. solution of salicylic acid in glycerin.

40 WEST TWENTY-FOURTH STREET, NEW YORK.

* London "Lancet," 1882, No. 1.

† "Klin. Monatsbl. f. Augenheilk.," Bd. xix, p. 423.

The New York Medical Journal,

A WEEKLY REVIEW OF MEDICINE.

PUBLISHED BY
O. Appleton & Co.



EDITED BY
Frank P. Foster,
M. D.

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